

Figure 1

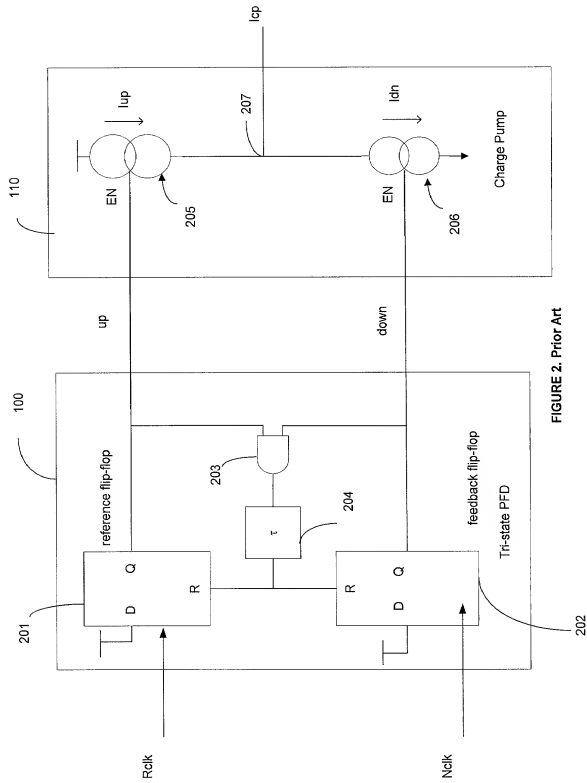


FIGURE 2. Prior Art

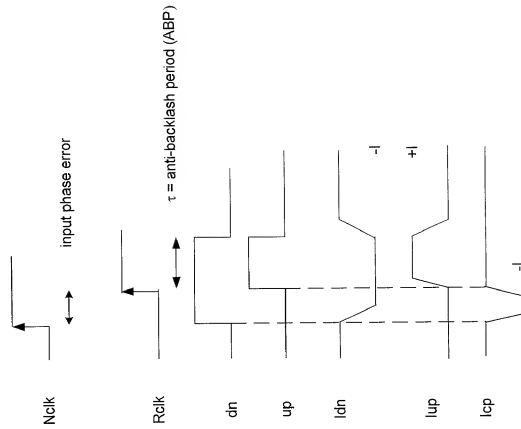


FIGURE 3. Operation of Prior Art Tri-state PFD and Charge Pump with perfectly matched up and down currents

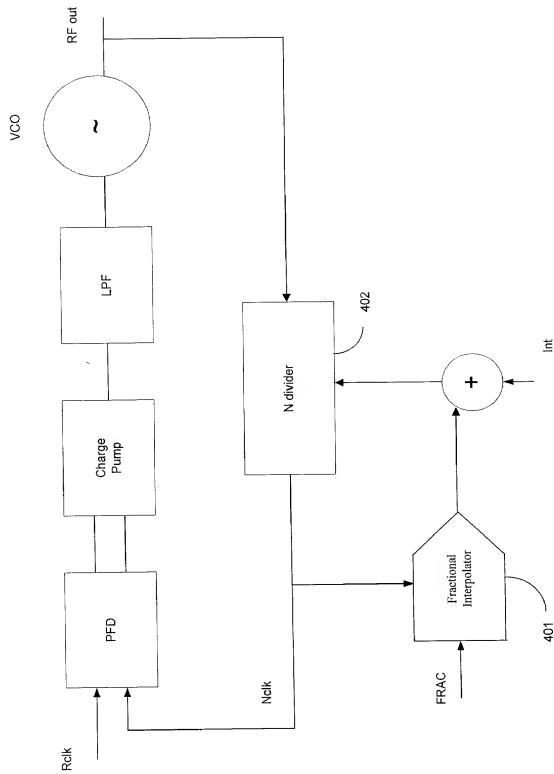


FIGURE 4. Prior Art Fractional-N PLL

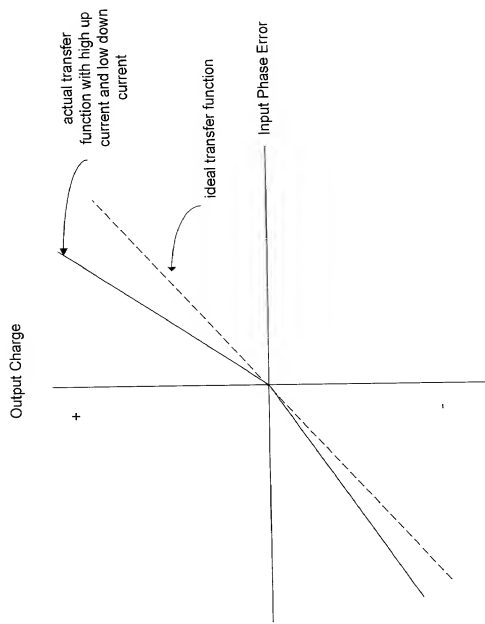


FIGURE 5. PFD transfer function with non-linearity due to mis-match

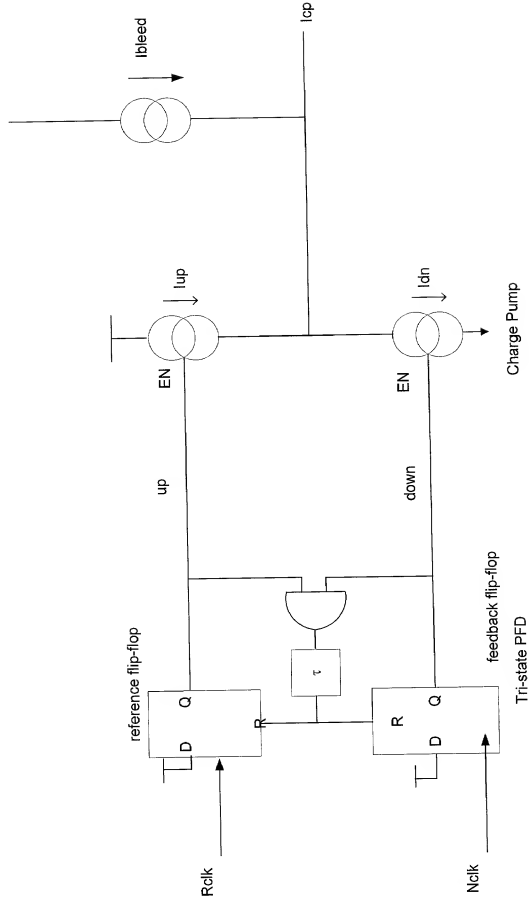


FIGURE 6. Prior Art PFD/Charge Pump with bleed current

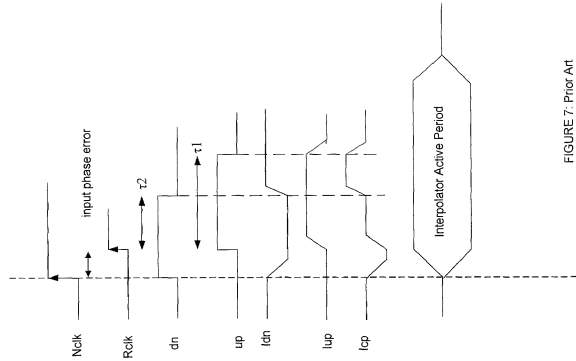


FIGURE 7: Prior Art

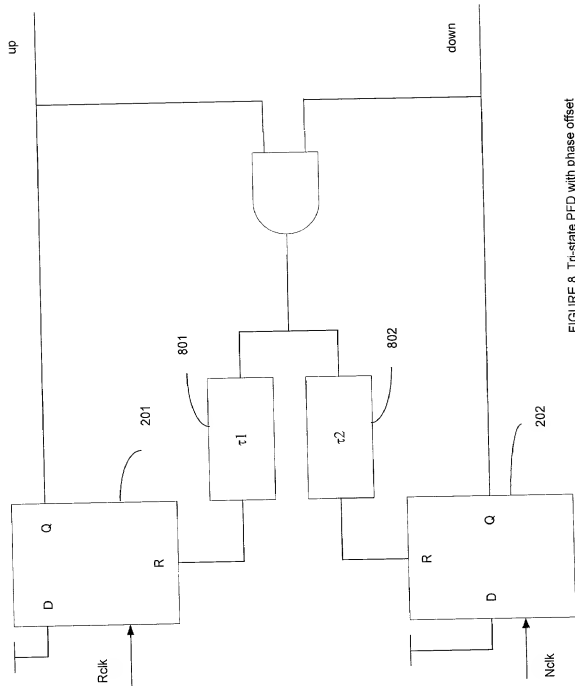


FIGURE 8. Tri-state PFD with phase offset



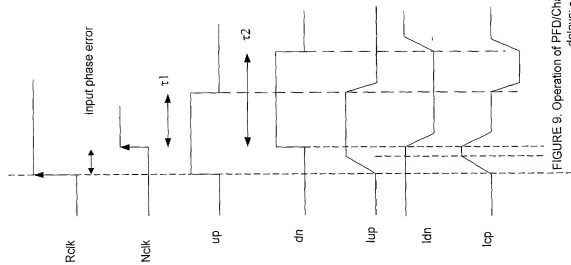


FIGURE 9. Operation of PFD/Charge Pump with different reset delays.  $\tau_1, \tau_2$

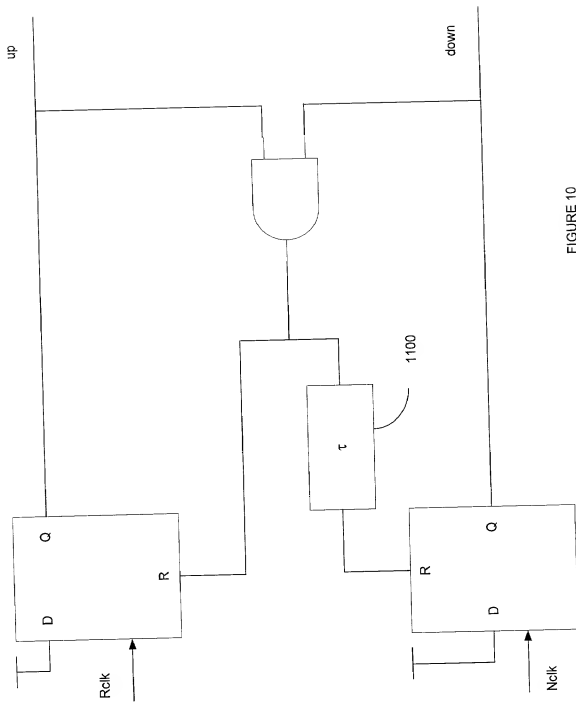


FIGURE 10

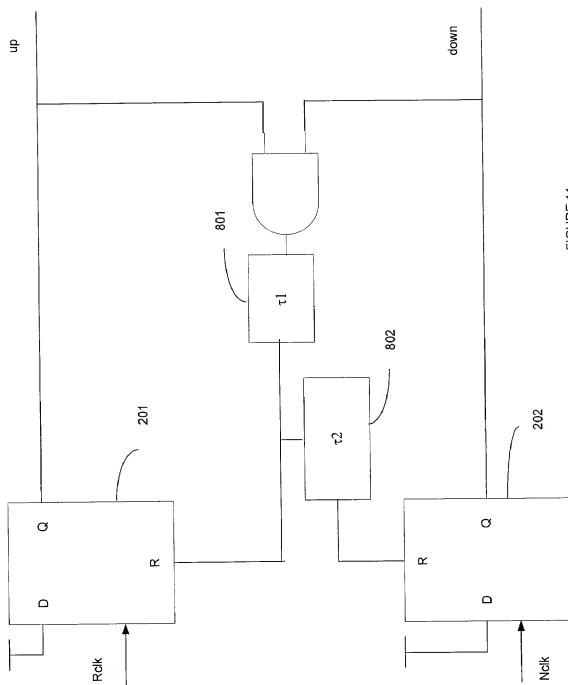


FIGURE 11

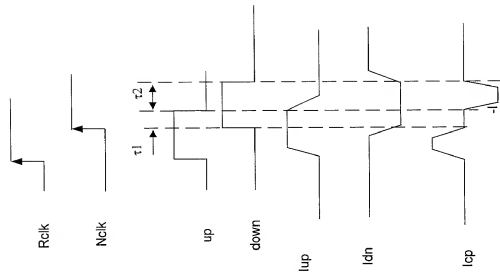


FIGURE 12 Operation of PFD/Charge Pump with delay on reset to Nclk

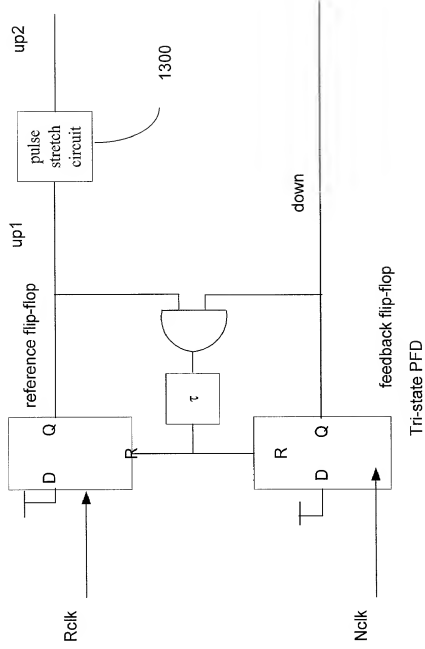


Figure 13

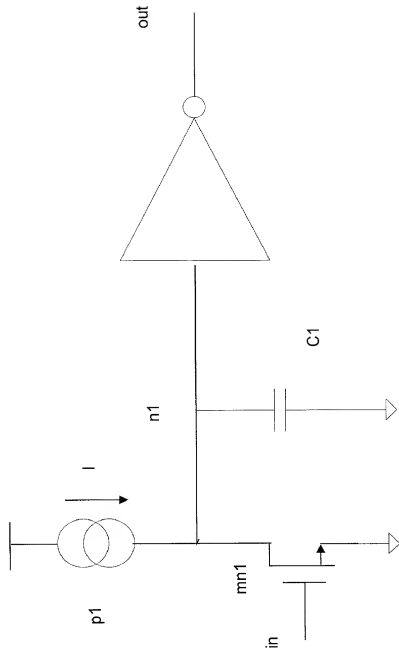


Figure 14

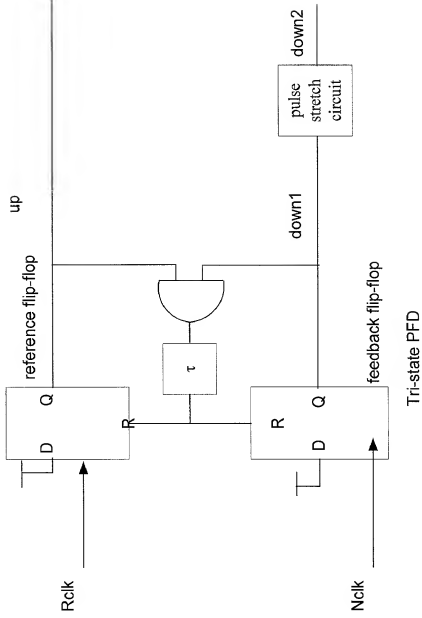


Figure 15